

#1,50

QE

754

F47

1849

Pl. 1-6

NH

H. B. Meek

~~560.242~~
B862

MEMOIRS

OF THE

GEOLOGICAL SURVEY

OF

THE UNITED KINGDOM.

Figures and Descriptions

ILLUSTRATIVE OF

BRITISH ORGANIC REMAINS.

DECADE I.-VI

PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF HER MAJESTY'S TREASURY.

LONDON:

PRINTED FOR HER MAJESTY'S STATIONERY OFFICE:

PUBLISHED BY

LONGMAN, BROWN, GREEN, AND LONGMANS.

1849.

N O T I C E.

PALÆONTOLOGICAL researches forming so essential a part of geological investigations, such as those now in progress by the Geological Survey of the United Kingdom, the accompanying plates and descriptions of British Fossils have been prepared as part of the Geological Memoirs. They constitute a needful portion of the publications of the Geological Survey, and are taken from specimens in the public collections, or lent to the Survey by those anxious to advance this branch of the public service. Although numerous drawings had previously been made, and engravings from them considerably advanced, it was not thought expedient to commence their publication until the large collections of the Survey could be well examined, which a want of the needful space has, until the present time, considerably retarded. This impediment to progress is now being removed, and when the collections can be properly displayed in the New Museum of Practical Geology, in Jermyn Street, it is hoped that the public will have an opportunity of gradually obtaining, in a convenient manner and at small cost, a work illustrating some of the more important forms of animal and vegetable life there preserved, and which have been entombed during the lapse of geological time in the area occupied by the British islands.

The plan proposed to be followed in the work, of which the two Decades now published form a part, is as follows:—

To figure in elaborate detail, as completely as possible, a selection of fossils, illustrative of the genera and more remarkable species of all

classes of animals and plants the remains of which are contained in British rocks ; to select especially such as require an amount of illustration which, to be carried out by private enterprise, would require a large outlay of money, with little prospect of a return, and a long time to accomplish, but which, by means of the staff and appliances necessarily employed on the Geological Survey, can be effected at small cost, and with a rapidity demanded by the publication of the maps and memoirs of the Survey ; thus, it is hoped, affording an aid to those engaged in the sciences with which this work is connected, that they might not otherwise have possessed, and which may materially promote the progress of individual research.

H. T. DE LA BECHE,
Director-General.

Geological Survey Office,
24th May, 1849.

BRITISH FOSSILS.

DECADE THE FIRST.

THE first Decade of representations of British Fossils is devoted to a selection of Echinoderms, of the Orders *Asteriadae* and *Echinidae*.

With the exception of the *Crinoidea* and *Cystidea*, no special monographs have been devoted to the illustration of our fossil species of Echinodermata, notwithstanding their acknowledged importance in a geological point of view. The majority of species found in British strata are unfigured in British works; a very great number are not figured at all, and those of which we possess British figures are, for the most part, delineated either imperfectly or insufficiently for the demands of science in its present state. This is the more remarkable since, for the description and delineation of numerous species, ample materials exist in collections.

Of the following plates, one is devoted to figures of all the Silurian star-fishes as yet discovered in British strata. None of these have hitherto been represented in any work. Their names only, accompanied by short descriptive characters, have appeared in the "Synopsis of British Fossil Asteriadae," contained in the second part of the second volume of the "Memoirs of the Geological Survey of Great Britain." Some remarkable new forms of star-fishes from the Oolites, and all as yet discovered in the London clay, are figured in the second and third plates.

The fourth plate is devoted to a representation of the only fossil as yet discovered of the family *Euryales*, now for the first time described and figured, through the kind co-operation of the Rev. Professor Sedgwick.

In the six following plates a series of illustrations of the British fossil *Echinidae* is commenced, of the majority of which, even the commonest and those most important for the identification of strata, no good representations are accessible to the student of English fossils. The importance of a knowledge of the members of this family to the explorers of oolitic and cretaceous strata cannot be too strongly insisted on, and their beauty and interest, in a purely Natural History point of view, render them admirable subjects for elaborate delineations.

When the collections accumulated during the course of the progress of the Geological Survey have been thoroughly examined and arranged, new light may be expected, bearing on the details of structure of the species now figured. Additions will consequently be made to the plates from time to time; and it is proposed to issue supplementary figures of the variations of form exhibited by the several species selected as subjects for these decades.

EDWARD FORBES.

May, 1849.

BRITISH FOSSILS.

DECADE I. PLATE VIII.

GALERITES (DISCOIDEA) CYLINDRICUS.

[Genus GALERITES. LAMARCK. (Sub-kingdom Radiata. Class Echinodermata. Order Echinidæ. Family Cassidulidæ.) Body more or less hemispherical, always tumid; ambulacra simple, continuous, radiant; mouth central, inferior; anus inferior, or sub-marginal; tubercles perforate.]

[Sub-genus *Discoidea*. Body hemispheric, circular, flat-based; tubercles in regular series; inside strengthened by strong ribs.]

SYNONYMS. *Galerites cylindricus*, LAMARCK (in 2nd Ed., iii., p. 311). *Conulus Hawkinsii*, MANTELL, Geol. Trans., New Ser., vol. iii., part 1, p. 208, *Galerites Hawkinsii*, DESMOULINS, Tab. Syn., p. 254. *Galerites canaliculatus*, GOLDFUSS, p. 128, pl. 41, f. 1. *Scutella depressa* and *S. hemisphærica*, WOODWARD, Geol. Norfolk, p. 52, t. 5, f. 4 and 5. *Discoidea cylindrica*, AGASSIZ, Echin. foss. Suiss., part 1, p. 92, t. 6, f. 13. 15. DESOR, Monog. Galerites, p. 58, t. 8, f. 8-16. AGASSIZ and DESOR, Cat. Rais. des Echin., Ann. Sc. Nat., 3rd ser., vol. vii., p. 147. *Galerites (Discoidea) cylindrica*, RÖMER, Nord-Deutsch. Kreide Geb., p. 31.

DIAGNOSIS. *G. (Discoidea) inflata, magna, hæmisphærica seu (adultæ), subcylindrica; ventre plano, ano parvo; areis ambulacralibus tertiam partem arearum interambulacralium æquantibus; assulis ambulacralibus 5 ad assulam interambulacralem appositis.*

Desor, in his "Monograph of the Galerites," and Bronn, in his "Index Palæontologicus," refer to this beautiful fossil the figures given by Leske of his *Echinites quaterfasciatus* and *Echinites series-fasciatus* (Leske ap. Klein, t. 47, f. 3-5, and 50, f. 1 and 2, copied in the "Enc. Meth." *Echinus quadrifasciatus* and *Echinus sexfasciatus*, Gmelin, 3183 made two species of *Galerites* by Lamarck), considering them as monstrous varieties; but a careful inspection of the figures of Leske, representing two casts, is sufficient to show that they are the nuclei of species of the subgenus *Galerites*, and not of the subgenus *Discoidea*. Had they represented casts of monstrosities of *G. cylindricus*, they would have exhibited the regularly arranged furrows caused by the impressions of the internal ribs. The history of the species dates, therefore, from its definition as such by Lamarck. Desmoulins and Dujardins have confounded it with tertiary urchins, and added synonyms to the Lamarckian name which do not belong to it. The best

representations of it are those given by Goldfuss and by Desor. The figures in Woodward's "Geology of Norfolk," referred to in the synonyms, are slight but characteristic.

Description.—The outline is orbicular; the ventral surface flat; the dorsal very convex, varying in stages of growth from regularly hemispherical to hemispherico-cylindrical, the latter shape being its final condition. The upper surface is sparingly granulated with minute tubercles, and is divided into 10 narrow and 10 broad segments, those of each set being of equal dimensions, by the poriferous avenues. The under surface is nearly flat, similarly divided, impressed in the centre for the mouth, and perforated between the mouth and posterior margin for an elliptical rather small anus.

The interambulacral segments are, in their widest part, three times the breadth of the ambulacral. The plates of the dorsal surface, towards the centre and lower parts of the sides, are horizontal, broad, and vertically narrow, those only near the summit being of equal dimensions everyway. Whatever be their horizontal diameter, their vertical measurement is nearly alike in all. Their surfaces are studded with minute granules, somewhat scattered towards their sides, but clustered towards their centres, where they group themselves moniliformly around the few scattered small primary tubercles, of which there is only one on the uppermost plates, though they gradually increase in numbers down the sides to as many as seven or eight. Of these one is always on each plate in the line of slight carination, which runs down each half of each interambulacral area. The lowest series of plates, towards the margin, bear numerous primary tubercles, of which those towards the centro-ambulacral suture are arranged in regular horizontal rows. The interambulacral plates of the ventral surface are still more conspicuously ornamented with rows of primary tubercles, each surrounded by a conspicuous impressed circle, bounded by granules, which are larger and more thickly set than on the upper surface. The inferior interambulacral plates, towards the margin, are much narrower than those near the mouth. The inferior interambulacral spaces bulge out on each half near the margin; a bulging which is continuous with their carination above, and which indicates the position of the strengthening ribs in the interior of the test.

The superior ambulacral plates are very numerous, and vertically very narrow. Their surfaces are speckled with granules, and at intervals, generally of threes, the uppermost ones bear primary tubercles, which become more numerous towards the centre and margin. Each plate corresponds to a pair of pores in the ambulacral avenue, which is scarcely, if at all, impressed. The pairs of pores are larger and more conspicuous on the dorsal than on the ventral surface. Dorsally four of

them, and consequently as many ambulacral plates, correspond to each interambulacral. On the ventral surface they become doubled in number, so as to form rows of twos, and near the mouth, where the ambulacral plates widen considerably, two such rows go to each plate. The primary tubercles are all perforate, and the rim of the protuberance in which they are set is crenulated.

The mouth is small, obscurely pentagonal, and in diameter equal to one-fourth of the distance between it and the margin. The anus is oblong, and somewhat acute at each extremity. It occupies rather more than one-fourth of the space between the mouth and the margin, and is distant from the margin its own longitudinal diameter. It is in the centre of an inferior interambulacral space, and is as if cut out of the plates, its margins being on a level with them, except the inner extremity, where there is a bulging.

The apex is composed of the combined ovarian and ocular plates, and is often slightly prominent, in consequence of the convexity of the ovarian plates, both individually and collectively. The centre assemblage forms a slightly oblong or obscurely pentagonal area, conspicuously divided into five parts by the five ovarians. Of these the left antero-lateral is largest, and appears to represent a madreporiform plate, and the left postero-lateral smallest. The other three are of about equal dimensions. The ovarian pores are placed near the outer and central edges of each plate, except the posterior one, which is obsolete. The ocular plates are very small, obscure, and triangular. The ocular pores are developed in all five. The greatest diameter of the apical crown of plates is less than the breadth of the mouth.

Localities and Geological Position.—In the chalk marl and lower chalk, Hamsey, near Guildford (Mantell). Markham Gayton (Woodward). Charing (Morris). Lewes, Dover, Burham, near Maidstone (Survey Collections).

Foreign Distribution.—In many localities (chalk marl) of France and Germany.

DESCRIPTION OF THE PLATE.

Fig. 1. Hemispherical, or half-grown form of the species (Survey Collection) seen in profile, and surrounded by an outline representing the perfect and cylindrical contour of a full-grown specimen (in the British Museum). Figs. 2 and 3. The former specimen seen from above and below. Fig. 4. Diagram of the mouth; and Fig. 5, of the anus. Fig. 6. Centro-lateral, ambulacral, and interambulacral plates, with their tubercles, granules, and pores. Fig. 7. Ambulacral and interambulacral plates, &c., of ventral surface. Fig. 8. A primary tubercle, with surrounding granules, from the ventral plates. Fig. 9. A similar tubercle, from a dorsal plate.

Allied British Species.

In the collection of Mr. Tennant there is a very beautiful, though imperfect, specimen of a *Discoidea*, nearly allied to, but quite distinct from *cylindrica*; it was found in the upper green sand of Somerset. It measures a little more than an inch in diameter, by nearly eight-twelfths of an inch in height; is hemispheric, with a tendency to become subcylindrical, and has plates horizontally proportioned and ornamented as in the *cylindrica*, but differing materially in their relative number; there being six (instead of four) ambulacra, and, consequently, as many pairs of pores, to each interambulacral. The anus, moreover, is much nearer the margin, and larger than in the allied species.

The *Discoidea favrina* of Desor (Monog. Galerites, p. 62, pl. 7, f. 12-14, called *rotula* on the plate), from green sand near Rouen, seems to be its near ally, if not identical; though it also resembles considerably the same author's *D. conica* (t. 7, f. 17-22). Unfortunately neither figures nor descriptions indicate sufficiently the distinctive character of the relative numbers of pairs of pores and interambulacral plates. The original *Nucleolites* or *Galerites rotula* of Alexander Brongniart (see Cuvier, Ossements fossiles, vol. ii. p. 614, plate IX., fig. 13), appears, judging from the figure, to be only a rather large specimen of *Galerites (Discoidea) subuculus*, and is quoted as such by M. Desor, in his synonymy of that species. As such it is quite distinct from the *Discoidea rotula* of Agassiz, in the "Echinodermes fossiles de la Suisse" (1st part, p. 90, t. 6, f. 10-12); but, nevertheless, the same figure of Brongniart is again cited by M. Desor, as a representation of *Discoidea rotula*, at page 61 of his "Monograph of Galerites." Dr. E. Sismonda, in his "Memoir on the Fossil Echini of Nice" (1843), enumerates *Discoidea rotula*, from the green sand near Nice, and cites Alexander Brongniart's figure, as well as those given by Agassiz in his "Descriptions of the Fossil Echini of Switzerland." Unfortunately no figure is given of the Italian species, nor are the relations of the ambulacral, as compared with the interambulacral plates mentioned in his description; but for the comparison he makes of it to the *Discoidea cylindrica*, it is not improbable that our fossil may prove identical specifically with that from Nice. In Mr. Morris's "Catalogue of British Fossils," *Discoidea rotula* is enumerated as a British fossil from the lower chalk of Maidstone and Dover, with a reference to the figures of Brongniart and Agassiz, cited above. This mention of *D. rotula* has escaped Mr. McCoy, who again enumerates a fossil under that name, referring to Agassiz alone as an authority, in his list of Mesozoic Radiata not included in Morris's catalogue, and preserved in the geological collection of the University of Cambridge (Annals of Nat. Hist., 2nd ser., vol. ii., p. 420): the specimen he cites is from the upper chalk of Norwich.

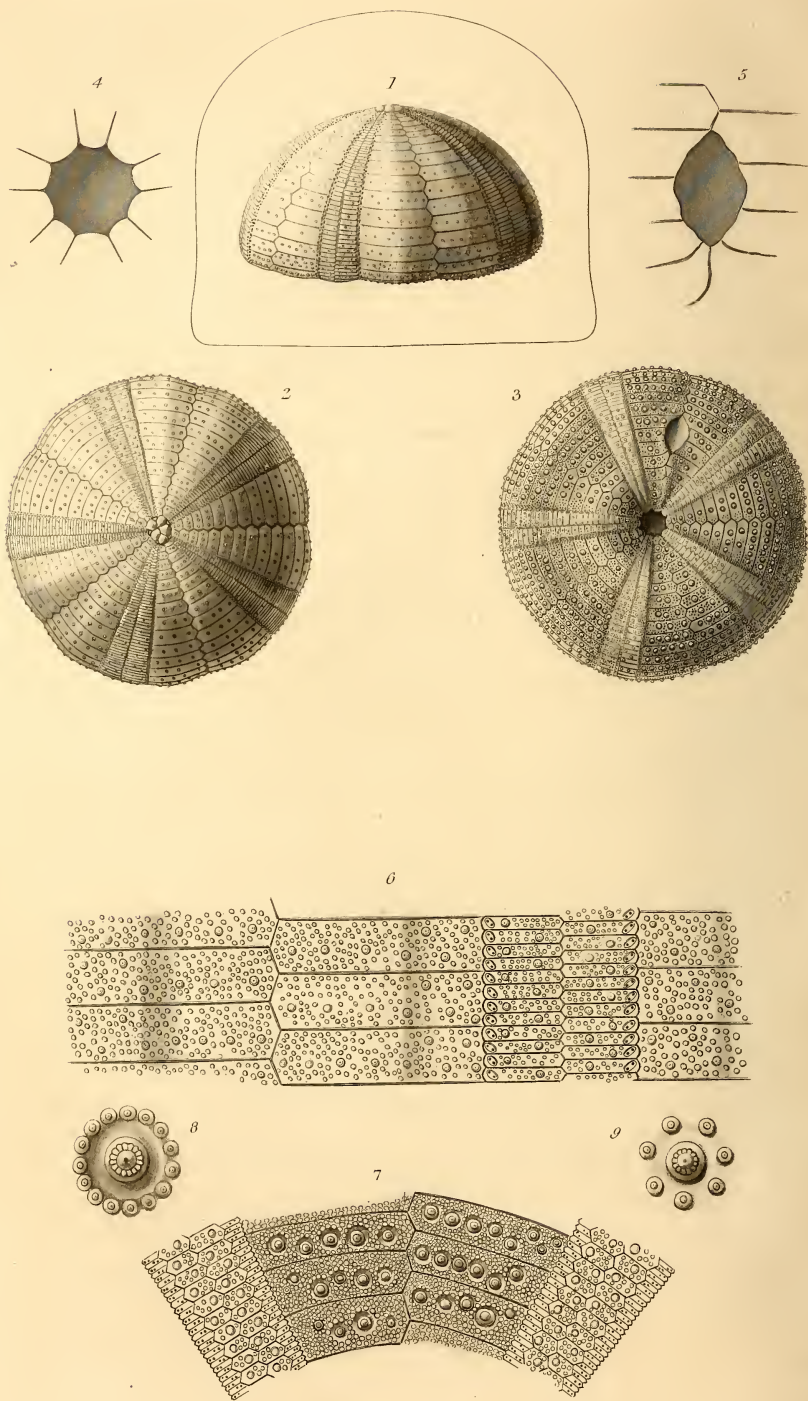
I think it not improbable that in the end we shall have to adopt the specific appellation *Favrina* for the green sand species; and that the chalk specimens alluded to will prove varieties of *cylindrica*; but a comparison of the types themselves only can settle the matter.

E. FORBES.

April, 1849.

Geological Survey of the United Kingdom.

GALERITES
(Cretaceous)



GALERITES (DISCOIDEA) CYLINDRICA. *Jamarck.*